Task Force for the

ADAPTIVE MANAGEMENT OF WATERFOWL HARVESTS

Arlington, Virginia
January 27, 1995

EXECUTIVE SUMMARY

Late in 1994, Mollie Beattie, Director of the Fish and Wildlife Service (Service), invited recognized leaders in migratory bird conservation to help address needed technical and administrative reforms in the process of regulating waterfowl harvests. This report provides a brief summary of the task force's first meeting in Arlington, Virginia on January 27, 1995.

This meeting was devoted to a discussion of adaptive harvest management (AHM), which is a strategic process for dealing with the uncertainty inherent in the management of biological resources. The primary differences between AHM and the current process are the need for clearly-stated, agreed upon management objectives and the use of the regulatory process itself to learn more effectively about the effects of hunting. Advantages of AHM include: (1) an opportunity to resolve long-standing controversies about the effects of hunting regulations, while pursuing population and harvest objectives; (2) increased objectivity and integrity in the decision-making process; (3) a clearer focus on long-term management (i.e., sustainability); (4) a better understanding of harvest management objectives; (5) clearly-defined roles of data-gathering programs in the decision process; (6) stronger cooperation between migratory bird management and research; and (7) explicit accounting for all sources of uncertainty in resource management.

The task force believes that the Fish and Wildlife Service and Flyway Councils should make as much progress as possible toward implementing AHM in 1995. The task force recognized that complete implementation is not possible in this short time-frame. However, the task force believed that at a minimum, the Service and Flyway Councils should strive to agree on a set of regulatory packages and guidelines for their use in 1995. The regulatory packages and guidelines should be viewed as interim only; different regulatory packages and guidelines likely will be established as AHM evolves. The task force also suggested that the National Flyway Council meeting and the North American Wildlife and Natural Resources Conference be viewed as opportunities to communicate the AHM initiative, build consensus for the 1995 regulations process, and begin the dialogue on the long-term objectives for harvest management to be used in full implementation of AHM.

Meeting of the Task Force for the

ADAPTIVE MANAGEMENT OF WATERFOWL HARVESTS

Arlington, Virginia
January 27, 1995

Attendees:

Task Force Members:
Ken Babcock (Missouri Department of Conservation)
Perry Olson (Colorado Division of Wildlife)
John Rogers (Region 2, Fish and Wildlife Service)
Rollin Sparrowe (Wildlife Management Institute)
Paul Schmidt (Office of Migratory Bird Management, FWS)

Service Regulations Committee Members:
Ron Lambertson (Region 5, Fish and Wildlife Service)

Presenters:
Fred Johnson (Fish and Wildlife Service)
Jim Nichols (National Biological Service)
Ken Williams (National Biological Service)

Background

Late in 1994, Mollie Beattie, Director of the Fish and Wildlife Service (Service), invited recognized leaders in migratory bird conservation to help address needed technical and administrative reforms in the process of regulating waterfowl harvests. This report provides a brief summary of the task force's first meeting in Arlington, Virginia on January 27, 1995.

This meeting was devoted to a discussion of adaptive management, which is a strategic process for dealing with the uncertainty inherent in the management of biological resources. By managing adaptively, uncertainty is accounted for and reduced whenever possible, while simultaneously pursuing harvest and population objectives. The Office of Migratory Bird Management (MBMO), in cooperation with the Flyway Council Technical Sections, has developed a proposal for adaptive harvest management, which was presented to the task force at this time.

Introductory Remarks

Director Beattie welcomed the members of the task force and indicated that adaptive harvest management is an extremely important initiative. No one is happy with how the regulations process worked last year and she views adaptive management as a critical component in improving the management of waterfowl harvests. The Director hopes that the task force will facilitate communication between the Service, State wildlife agencies, non-governmental organizations, and the public as we seek these and other improvements.

Paul Schmidt, Chief of the Office of Migratory Bird Management, also provided comments that explained the motivation for seeking improvements in the hunting regulations process. All governments are looking for increased efficiency. The IAFWA is seeking ways to improve State and Federal partnerships by reviewing the Flyway Council System. Important biological processes and the effects of hunting are not well understood; thus, learning must become a legitimate goal of management. The process of decision-making must be explicit, clear, and agreed to by all stake-holders.

Most parties in the management of migratory bird harvests agree on the need for: (1) better definition of the objectives of harvest regulation; (2) increased objectivity and integrity; (3) better use of the survey data in decision-making; (4) a clearer focus on long-term harvest strategies; (5) simplified hunting regulations; and (6) a simplified and streamlined process of setting hunting regulations. In addition we need: (1) improved partnerships between State and Federal entities; (2) focused arguments on the methods, objectives, and the decision process; not the decision itself; and (3) increased attention to education and outreach. The adaptive harvest management proposal is designed to address these needs.

The Motivation of Adaptive Harvest Management (Jim Nichols)

Requirements for informed management of animal populations are: (1) goals, (2) management actions, (3) information about population and goal related variables, and (4) knowledge about effects of management actions. The focus here is on our current understanding of the effects of hunting on the waterfowl resource.

There are two key relationships to consider in harvest management. Hunting regulations result in harvest and harvest affects population status. Available data suggest that harvest rates increase in years of liberal regulations and decrease during years of restrictive regulations. However, managers often are unable to direct harvest pressure away from, or toward, populations to the desired degree. Moreover, regulation

components (season length, bag limit, etc.) have varied simultaneously; thus, managers are unable to predict harvest rates as a function of these individual regulatory components.

There is no definitive answer regarding the effect of harvest on waterfowl population status. Some studies support the compensatory mortality hypothesis, while others support the additive mortality hypothesis. Under the additive hypothesis, hunting mortality is always additive to natural morality. Under the compensatory hypothesis, increases in hunting mortality are accompanied by decreases in natural mortality (up to some threshold harvest rate). While there is much room for debate with ducks, the evidence for geese is that harvest is largely an additive form of mortality.

In theory, populations also can compensate for hunting mortality by increasing their reproductive rate. When bird numbers are low, resources needed for reproduction (food, cover, water) are abundant and reproductive rates are relatively high. As bird numbers increase, available resources have to be shared more widely and recruitment rates decline. If populations are lowered as a result of hunting, there will be more resources available for each bird, recruitment rate will rise, and hunting losses will be recouped. There is strong evidence that cavity-nesting species such as wood ducks can respond in this manner. The evidence is less conclusive for prairie-nesting species.

The uncertainties in our understanding about the relationships among hunting regulations, harvest, and population status has led a number of biologists, including individuals employed by both Federal and State agencies, to call for an experimental approach to harvest management:

"The concept that hunting is a compensatory form of mortality has a far-reaching impact on our waterfowl management and research programs in North America. For this reason, we believe our results should be carefully and deliberately tested in the field" (Anderson and Burnham 1976).

"We recommend periodic 'new looks' at the mallard data as more years become available, but our expectations for such work are not very high unless deliberate efforts are made to vary hunting mortality rates in an experimental manner" (Nichols, Conroy, Anderson, and Burnham 1984).

"... an experimental approach... may provide our best hope for additional insights on compensatory/additive mortality hypotheses in wild waterfowl populations" (Montalbano, Johnson, Miller, and Rusch 1988).

"... we emphasize the importance of an 'adaptive' attitude in migratory bird management, wherein the objectives of management and the need for information gathering are both addressed through such mechanisms as regulatory 'experimentation'" (Williams and Nichols 1990).

However, experimentation has not occurred because society has been unwilling to forego hunting opportunity or permit harvest at levels that might endanger the resource. Adaptive harvest management is an alternative to experimentation. By using the adaptive approach, management can lead to learning and a resolution of long-standing controversies, while simultaneously achieving harvest and population objectives.

Adaptive Management and the Regulation of Waterfowl Harvests (Ken Williams)

Adaptive harvest management (AHM) is management in the face of uncertainty with a focus on its reduction. There are three operational components of AHM: (1) the decision-making component involving the Service Regulations Committee, the Flyway Councils, conservation organizations, and the public; (2) resource monitoring programs (banding, population and harvest surveys); and (3) the analysis or assessment component involving the technical committees, MBMO, and migratory bird research. A critical role of the decision-makers is to establish the specific goals and objectives for harvest management. The monitoring programs provide the data used in technical assessments. The data are analyzed and key population parameters are estimated and the impacts of regulations are predicted through the use of models. Recommendations are then handed back to the decision-makers who choose hunting regulations that best meet management objectives. In the following year, new data from the monitoring programs allow managers to gauge performance and to make necessary adjustments in harvest strategy.

So what is new about AHM? Aren't we already cycling between monitoring, assessment, and decision making? The difference is that, along with being more explicit about management objectives, the pursuit of useful information is part and parcel of the AHM process. In AHM, managers use the regulatory process as an opportunity to reduce key uncertainties about the relationships between hunting regulations and population status.

The technical components of AHM include: (1) an array of potential regulation packages (limited); (2) a set of models representing population dynamics and the impacts of harvest; (3) a measure of "uncertainty" for each model; and (4) an objective function for evaluating and comparing regulatory options. Potential regulation packages might, for example, be viewed as liberal, moderate, and conservative. There must be a limited

number of packages to permit their evaluation. Population models are used to predict population responses to regulations. Models must represent meaningful hypotheses about the impacts of harvest and the environment. The objective function expresses long-term conservation and harvest opportunity goals and is used to evaluate and compare regulatory options. These components are then folded into an analysis that provides a regulatory strategy that facilitates learning, while simultaneously pursuing harvest and population objectives.

Progress to date has included: (1) establishment of an interagency technical working group; (2) various technical workshops and presentations; (3) development of necessary optimization theory; (3) development of computer software; and (4) documentation of concepts and findings. However, progress has been limited largely to the technical arena; the concept of AHM must be communicated to a broader audience.

Adaptive harvest management:

(1) provides a framework for decision-makers and stake-holders to resolve conflicts;
(2) includes an explicit statement of management objectives, key biological assumptions, operating constraints, etc.;
(3) involves balancing short-term harvest benefits against long-term conservation goals;
(4) retains a focus on recreational harvest, but also provides a platform for involvement of others interested in the management of waterfowl;
(5) explicitly recognizes the importance of information in reducing uncertainty and thereby improving management; and
(7) reinforces the linkage between research and management.

Following this presentation, computer simulations were conducted to demonstrate key concepts of AHM. There are a number of factors that affect the rate at which we can learn. The greater the precision of our monitoring programs, the faster we will learn and improve our decisions. We must recognize the limitations in the monitoring programs and redesign them as necessary. Higher harvest rates also lead to faster learning. However, if harvest rates are too high, populations will be depressed and managers will pay a price in terms of both population status and future harvests. Therefore, it is critical to balance the goal of learning with goals related to conservation and hunting opportunity.

Implementing Adaptive Harvest Management (Fred Johnson)

This presentation focused on the practical, rather than the conceptual, aspects of implementing AHM. Issues discussed were: (1) harvest management goals, objectives, and constraints; (2) regulatory options; (3) model sets (i.e., alternative hypotheses

about the effects of management); and (4) expectations and realities relative to implementation of AHM.

Goals are general statements of desired outcomes. With respect to waterfowl harvest management, they likely include: (1) sustainable harvests; (2) regulations that are more objective, more predictable, and less complex; (3) enhanced Flyway-based management; and (4) learning through experience.

Objectives are more specific than goals and typically relate to the size of the harvest and the size of the population. International treaties relating to the conservation of migratory birds clearly mandate that the opportunity to harvest waterfowl is of lesser importance than the protection and maintenance of populations. Although this setting of priorities is useful to managers, the existence of potentially competing objectives (i.e., size of the harvest vs. size of the population) leaves much room for debate about appropriate harvest strategies. Even if all management strategies under consideration provide sustainable harvests, there still can be a great deal of variability in average population size realized under the alternative strategies.

Waterfowl population goals have been identified in the North American Waterfowl Management Plan (Plan). These goals were established to ensure satisfactory levels of hunting opportunity, but also for ecological, aesthetic, and non-consumptive purposes. While the Plan has a habitat focus, the population goals have been formally endorsed by the Federal Governments of Canada, the U.S., and Mexico. Therefore, waterfowl managers have some obligation to consider them in the development of harvest strategies. However, we believe it unreasonable to make the Plan's population goals the sole consideration in harvest management, particularly if habitat is not adequate to support such population levels.

Beyond harvest management objectives, there are a number of constraints that we may wish to consider. For socio-political reasons, there may be a minimum population size desired before a season will be permitted. It may also be desirable to limit the temporal variability in regulations.

For AHM to be successful, a small number of regulatory packages representing, for example, a restrictive, moderate, and liberal seasons must be developed and agreed upon by all parties. The number of options must be limited so that technical staff can assist decision-makers by analyzing the options in advance of the decision. Other criteria for regulatory options are: (1) the capacity to elicit different harvest and population responses; (2) the predictability of harvest rates under each package; (3) hunter preferences; and (4) law enforcement considerations.

The AHM process considers alternative models of population dynamics and attempts to reduce the uncertainty regarding which model is most appropriate for the population. The alternative models must: (1) imply different harvest strategies (or there is no value in learning); (2) predict responses that are sufficiently different to be detected by the monitoring program (so that learning can occur); and (3) be consistent with historical experience (i.e., data-based).

It is important to recognize that AHM is not a panacea. The management of multiple species and multiple populations will continue to be troublesome. Setting explicit management objectives that are supported by all stake-holders will be extremely difficult. The development of useful models of population dynamics is still in its infancy. Learning may be slow. Policy-makers will need to be patient and demonstrate a commitment to the process.

Discussion (Task Force Members)

There was unconditional endorsement of adaptive harvest management. It was decided that the task force would continue to meet to help guide the AHM process in implementation and provide an important communications link to the various constituencies. The task force recognized that the implementation of AHM is an evolutionary process and that much needs to be done in developing consensus. It will be important for the task force to consider recommendations of the Flyway System Review that currently is in progress. The report of this review will be available in March.

In the short term, it is important that the Service and the Flyways work together to implement some components of the AHM process. Interim steps should be taken in 1995. In particular, it would be appropriate for MBMO to develop a small set of regulatory packages and a set of guidelines governing their use and present them, in draft, at the upcoming Flyway Council Technical Section meetings.

Although there were compliments for the technical progress, there was concern over sociological needs. We must collectively work to communicate the benefits of AHM to a wide array of constituencies. For AHM to be successfully implemented, endorsement is needed from outdoor writers, hunting and non-hunting organizations, and at the highest levels within the Department of the Interior. It was agreed that the concept likely would be welcomed within the Flyways, but people may still try to focus on the numbers and the outcome rather than the process. There was some discussion about how we could help the Service Director gain support for AHM within the Department of Interior.

There was strong agreement that we need to deal with management objectives in terms of harvest and populations goals. There was some comfort in using the North American Waterfowl Management Plan (Plan) populations goals, even though the plan goals have been described in terms of habitat. The Plan has already received a great deal of discussion and support by many interests. The task force should begin this discussion with the Plan Implementation Committee and the IAFWA's Plan Committee.

It was suggested that the task force take advantage of the upcoming North American Wildlife and Natural Resources Conference to communicate the AHM proposal and interim steps for the 1995-96 hunting season. The National Flyway Council meeting would provide a good venue. There should be some discussion at that meeting or at the subsequent Flyway Council meetings of harvest management goals and objectives. The presentation at the National Flyway Council should include the basic components of AHM and the long-term vision. The presentation should also be made to some of the ad-hoc hunting/conservation groups that also meet at the Conference. Perry Olson suggested that this would be a good issue for his IAFWA Communication Committee. Smaller meetings with the Flyway Council Chairmen and Consultants on Saturday prior to the National Flyway Council meeting would be helpful. The task force should be present along with representatives from the Service Regulations Committee.

The task force agreed to the following:

(1) to develop a report of the meeting (minutes) to serve as an interim report to the Director;
(2) to develop a set of formal recommendations for the Service Director;
(3) to meet with the Flyway Council Chairmen and Consultants at the North American Conference in March to discuss the 1995 regulatory process;
(4) to meet with the National Flyway Council to discuss the AHM proposal; and
(5) to meet after the North American Conference to assess progress and prepare further recommendations for the Director.

The meeting adjourned at approximately 4:30 pm.

Meeting of the Task Force for the

ADAPTIVE MANAGEMENT OF WATERFOWL HARVESTS

Arlington, Virginia
May 11, 1995

Attendees:

Task Force Members:
Ken Babcock (Missouri Department of Conservation)
Perry Olson (Colorado Division of Wildlife)
Wayne MacCallum (Massachusetts Division of Fisheries and Wildlife)
Norm Saake, substituting for William Molini (Nevada Department of Wildlife)
John Rogers (Fish and Wildlife Service)
Rollin Sparrowe (Wildlife Management Institute)
Paul Schmidt (Fish and Wildlife Service)

Service Regulations Committee Members:
Noreen Clough (Region 4, Fish and Wildlife Service)

Presenters:
Fred Johnson (Fish and Wildlife Service)
Bryan Swift (New York Department of Environmental Conservation)
Dave Case (D.J. Case & Associates)

Introductory Remarks

Paul Schmidt, Chief of the Office of Migratory Bird Management (MBMO), welcomed the group and reaffirmed our common resolve to improve the waterfowl harvest regulations process. Everyone appears to be in agreement that Adaptive Harvest Management (AHM) should be adopted for the long-term but there is a discernible lack of consensus on an acceptable, interim approach for the 1995 hunting season. A brief review of the events taking place since the last meeting of the Task Force in January was presented, including discussions and concerns about the proposed 1995 strategy voiced at the winter technical committee meetings in each Flyway and at the Flyway Council meetings in Minneapolis. Following the Council meetings in March, two additional members were added to the Task Force, representing the Atlantic and Pacific Flyways. Communication was emphasized once again as a key factor in the ultimate success of AHM. Furthermore, the importance of communication in influencing public reaction and acceptance of a duck harvest strategy for 1995 was also underscored. Finally, recent outreach efforts with non-government agencies and organizations by Paul and others in MBMO were identified. Feedback from these groups was very positive and appreciation was expressed for our efforts to keep them

informed about possible short and long-term harvest management strategies.

John Rogers, Deputy Director, Fish and Wildlife Service (Service), reaffirmed the Director's unequivocal support for AHM as a critical component in our collective efforts to improve the management of waterfowl harvests. The Director is looking to this group to help define the future of waterfowl management and is confident that future strategies can receive widespread support by all interested groups.

Flyway Council Reactions

Pacific Flyway: Norm Saake, substituting for William Molini, expressed a common concern that the circumstances surrounding last year's regulations process be avoided; otherwise, the likelihood of political intervention is even greater than in 1994. The majority of the Council members supported the proposed strategy for 1995, with only 1-2 States expressing any reservations for moving forward this year. There is unanimous agreement, however, that future application of AHM should incorporate more information from breeding areas important to the Pacific Flyway. Currently, model development is based predominantly on the mid-continent mallard database. Overall support for this year's proposal is based on the likelihood that the regulatory package chosen will be the liberal option and because the Flyways have been alerted well in advance of the traditional timetable what to expect in terms of regulatory options and possible criteria for their use. There are some minor concerns for specific components of these packages for 1995.

Central Flyway: Perry Olson began by reaffirming his support for AHM over the long-term and felt that there was an excellent opportunity in 1995 to incorporate as much of the AHM approach as possible. He stated that within the Flyway, there was some concern for some of the details of the regulatory packages over the long-term, but these would not have to be resolved this year. The issue of floating framework dates, however, was one aspect of these options that required further discussion in 1995. He summarized the Councils's deliberations in March on the 1995 proposed harvest strategy and restated the Council's request to the AHM Working Group to address the following 4 areas of concern:

(1) objective function - the proposed objective function needs to be reviewed, particularly how hunting opportunity is "valued" in relation to population objectives.

(2) "closed season" option - consider eliminating the "closed season" as a possible option in the decision matrix,

especially when it has the potential of causing adverse reactions in the public. Will we actually consider closing the season or just severely restrict it in a situation where populations experience a dramatic decline?

(3) future models - consider developing population models in the future for other species of ducks besides mallards; mid-continent mallards are driving the current process.

(4) harvest rates - regulatory packages may be more conservative overall than necessary because they were developed using harvest rates from a period when hunter numbers were higher.

There are obviously some communications challenges ahead with regard to external audiences. These concerns will be minimized if the 1995 breeding population survey results indicate significant increases, especially for mallards. If breeding populations remain unchanged or decline and the liberal option is chosen for 1995, there likely will be some public-relations fallout.

Mississippi Flyway: Ken Babcock reminded the group of the existence of separate regulatory committees - Northern and Southern - within the Mississippi Flyway Council and expressed hope that adoption of AHM would lead to an eventual unification of these committees within the Flyway. He described the support within the Flyway for AHM in the long-term and noted that the Lower Group had given its endorsement of the 1995 strategy at the recent Council meeting in Minneapolis. The Upper Group, however, had voiced its concern for the 1995 strategy, particularly its incorporation of elements of AHM, and questioned whether the likely perception that we were moving ahead with AHM in 1995 was wise. He stressed that we needed more dialogue at the technical level outside the Working Group. Additionally, most administrators do not understand the concept; yet these people will have to play a major role in outreach and communication efforts in the future. Ken expressed his personal feeling that the Task Force was created to foster consensus and partnerships on all aspects of this new approach among all interested parties. There may not be enough time this year to build these ties. No one questions the process and he complimented the Working Group for their ongoing efforts to maintain the technical quality of this initiative. Adaptive harvest management will succeed based on the technical work that has been done to date. However, other Flyways have voiced concerns about some aspects of the 1995 proposal, which indicate that there is not at this time complete buy-in or a sense of full partnership for this year. The key question is whether 1995 is truly a start-up year for AHM or simply a transition, or interim, year. It may be just a question of semantics regarding what the 1995 proposal is called and not what it really is or represents.

Atlantic Flyway: Wayne MacCallum indicated that the Atlantic Flyway Council endorsed the 1995 strategy proposal and supported the use of AHM over the long-term, with the caveat that future consideration be given to the data on waterfowl populations that have accrued in recent years in eastern North America. This concern is similar to that voiced by the Pacific Flyway about the current reliance of model development on mid-continent mallards. Given this concern, the Atlantic Flyway does consider 1995 as a transitional or interim year, and that consideration of information relevant to this flyway is not precluded when AHM is fully implemented in 1996. Consequently, it is extremely important to the Flyway that sufficient resources be brought to bear on the analysis and interpretation of these data in order that they may be used and incorporated into the process as soon as possible. Wayne also expressed concern by some within the Flyway that adoption of a liberal regulations package in 1995 might be perceived as moving too quickly. He emphasized, with examples of State wildlife management activities, the amount of time it takes sometimes to educate people about a "model-driven" management process.

Implementing Adaptive Harvest Management: A Report From the Adaptive Harvest Management Working Group (Bryan Swift)

Bryan Swift reviewed the Adaptive Harvest Management Working Group's April 1995 meeting, focusing on their review of the Service's proposed harvest strategy for 1995. No specific technical problems were identified, but some members of the group were concerned that they did not have an opportunity to review the proposal before it was announced in February. It is critical that the Flyways be directly involved in developing models, objective functions, and regulatory options to be used in 1996 and beyond.

Despite general agreement on technical aspects of the proposed strategy, the Working Group did not reach consensus on implementation in 1995 because of communications concerns. Some members believed that strong support within the Service for AHM (to avoid last year's experience) provided an important opportunity for changing the regulations process this year. Others believed that there had not been enough public discussion of AHM to ensure support from important conservation organizations, hunters, and the general public. This concern stemmed from the possibility that liberal regulations would be recommended in 1995 even if duck populations did not increase from 1994. Although the biological data would support this recommendation, it would be a dramatic change from harvest strategies used in recent years.

Bryan showed how changing the objective function affected the

optimal harvest strategy for 1995 (i.e., the regulations matrix on the last page of the proposal). None of the changes produced a high likelihood of moderate regulations for the observed range of mallard breeding populations and Canadian ponds. In addition the Working Group felt strongly that it was inappropriate to modify the objective function to produce desired results for a single year.

Concern about moving too quickly to implement AHM led to consideration of an alternative strategy for 1995. Bryan reviewed advantages and disadvantages of implementing the proposed strategy versus a more traditional, "prescriptive" approach that would result in moderate regulations unless mallard populations increased significantly from 1994. These were summarized also in a written report from the Working Group to the Task Force. Although the Working Group was split over what to do this year, all agreed that implementation of AHM was desirable, and that technical and communications concerns could be satisfactorily resolved by 1996.

Communication Strategies for Implementing Adaptive Harvest Management (Dave Case)

Dave Case provided an update on communications efforts relating to AHM. A draft communications strategy developed by the Working Group Communications Committee was distributed and reviewed. Goals and objectives identified in the strategy are:

Goals:

(1) Introduce the AHM components/procedures to be used in the 1995-96 duck harvest regulations process in a way that facilitates full and successful implementation of AHM in 1996 and beyond.

(2) Internal and external audiences support use of AHM as the long-term process for managing migratory bird harvests.

Objectives through September, 1995:

(1) Bring key internal audiences up-to-speed and supportive of AHM and associated procedures for the 1995-96 duck hunting regulations process.

(2) Assure that organizational spokes-people are on the "same page" concerning the communications strategy and key messages.

(3) Inform the outdoor media of the 1995-96 duck hunting regulations process and AHM in general.

(4) Introduce the "improved procedures" to interested waterfowl hunters and the organizations that represent them.

Guidelines for developing and implementing the communications strategy are:

(1) States must co-lead in efforts to promote and communicate AHM. It must not be perceived the Service is alone in pushing AHM.

(2) Present a unified message of support for using the AHM process.

(3) Recognize that this process is adaptive - the regulations packages and models can be modified periodically.

(4) Acknowledge that 1995-96 is a transition year.

(5) Focus on using existing communications networks of Federal and State agencies and non-governmental organizations to deliver key messages.

(6) Recognize that both technical and policy messages need to be communicated to both internal and external audiences all at the same time.

(7) Ducks, at this point, are the focus of AHM. Other groups (geese, swans, and cranes) may follow.

(8) For all audiences but technical, avoid describing AHM with the terms "experimental," "uncertainty," "maximizing harvest," "learning," and "new," etc.

(9) Do not oversell AHM as an immediate solution. Be sure to communicate about the "down-sides" of AHM.

The pros and cons of the various options for the 1995-96 regulations-setting process from a communications perspective were discussed. There was broad agreement among the Task Force members that successful implementation of AHM in 1996 and beyond hinged to a large degree on an effective communication effort targeted at both internal and external audiences. The Service and the Working Group are committed to implementing the communications strategy.

Strategic Planning for Adaptive Harvest Management (Fred Johnson)

Implementation of AHM promises to greatly improve the regulations-setting process, which has been characterized as laborious, prone to conflict, and biologically uninformative.

Adaptive harvest management has been defined as "managing in the face of uncertainty, with a focus on its reduction." Key features include: (1) unambiguous objectives, (2) a limited set of regulatory options, (3) alternative models of system dynamics, and (4) measures of confidence for the alternative models, which change through time as useful information accumulates. The purpose of this presentation was to describe the strategic issues involved in implementing AHM and to report on progress-to-date.

Strategic issues can be divided into those of a technical nature and those of a more administrative or sociological nature. Technical issues include: (1) the role of resource monitoring programs, (2) adaptive management concept, theory, and software development, (3) construction of system models, (4) patterns in regulatory strategies and expected management performance, and (5) protocols for assessment. Administrative issues include: (1) setting of harvest-management objectives, (2) consensus-building within the conservation community, (3) communication with external audiences, (4) the decision-making process, and (5) international coordination.

Currently, most technical issues present no major obstacles to a gradual and methodical implementation of AHM over the next few years. The technical issues of highest priority at this time are model development and the protocols necessary for updating model sets and designing/modifying the set of regulatory options. Prior to 1996, there is a need to develop models for populations of mallards outside the mid-continent region and to explore regulatory options that are both more restrictive and more liberal than those used in the recent past.

During the development phase of AHM, most emphasis was placed on technical challenges, so there has been less progress in dealing with administrative issues. Without question, the most important administrative issue is the setting of harvest-management objectives. Notably, there has been widespread agreement that managers should be able to articulate the role of harvest management in achieving the population goals of the North American Waterfowl Management Plan. There is also a recognition that AHM may precipitate some administrative changes to the decision-making process in the U.S., as well as promote closer coordination between the U.S. and Canada in harvest management. Internal and external communication strategies are critical for continued progress in these areas.

Further progress in implementing AHM is possible if: (1) a mandate for change exists; (2) there is a focus on long-term objectives; (3) there is a willingness to explore imaginative new approaches; (4) alternative models of system behavior can be formulated; (5) the institutional culture encourages learning; (6) policy-makers are willing to acknowledge that the consequences of management cannot be known with certainty; (7)

sufficient resources exist to cover "start-up" costs; (8) there is a willingness to accept unanticipated or undesirable results; and (9) there is sufficient institutional stability for long-term learning (patience and commitment are essential).

Group Discussion (Task Force Members)

In the afternoon, the group continued dialogue on a number of issues that had been raised during the morning presentations. The focus of these discussions was to reach consensus on a workable regulatory approach for 1995. The options presented in the Working Group report to the Task Force were reviewed again. These options included: (1) implementation of the interim strategy during 1995 without modification (i.e. adopting the optimal harvest decision), or (2) development of regulations using a more traditional approach, without implying that AHM was used for decision-making. One view expressed was the need to adopt the first alternative in 1995, irrespective of the likelihood that a liberal regulatory package would be chosen this year. Such an approach is biologically and technically sound and represents a reasonable transitional step to full implementation of AHM in 1996. Communications problems, even with a liberal package this year, would not likely be as critical with external audiences as there would be with internal groups within our own agencies and organizations.

The other alternative to be considered this year was to divorce any action in 1995 from AHM entirely, while anticipating full implementation in 1996. It was noted that, during discussions about the 1995 proposed strategy in recent weeks, there was some disagreement on specific elements of AHM contained in the proposal. The form of the objective function generated the most debate, particularly regarding how much relative emphasis should be placed on either hunting opportunity or attainment of the North American population goal for mallards. Other, less controversial, points of concern included the model set that expresses a range of hypotheses about the effects of breeding habitat and harvest on subsequent population size, and particular aspects of the regulatory packages that were outlined in the 1995 proposal. Because it was felt that consensus could not be reached on these elements over the next few months, a transitional strategy was suggested for 1995 that used "triggering" criteria, based on population change, to select an appropriate regulatory option. This strategy would not be described as incorporating any elements of AHM, thus allowing more time to build consensus on any contentious issues remaining prior to full implementation of AHM in 1996. This approach would also alleviate concerns of some States that the likelihood of selecting a liberal package of regulations in 1995, under Option 1, even with a "no change" in population status of mallards from last year, would be too much for the public to accept. Under a

"no change" or "slight increase" scenario, which may occur this year, a moderate package would be chosen for 1995. This option would be easier to support with the hunting community, and in reality, represents a liberalization from last year's regulations.

Considerable discussion among the Task Force members followed on each of the options. It was pointed out that there are obvious risks associated with the selection of either option. First, if Option 1 is chosen, there is the possibility that the public view would be negative, thus hurting the chances of a successful implementation of AHM in 1996. Alternatively, if Option 2 is selected, even though it is known that the other alternative is biologically and technically sound, the public may contend that politics had intervened in the regulatory decision-making process once more. These arguments underscored for the group the frustration of separating the biological from political considerations. It also emphasized the need for consensus-building among all those interested not only in the outcome for 1995, but also for the long-term use of AHM. It was reiterated that our most important target audience may be internal, i.e., those within our respective agencies and organizations. The best decision for an interim regulations approach this year may be one which fosters to the greatest extent support for the implementation of AHM in 1996.

The Task Force agreed to the following:

(1) to develop a report of the meeting (minutes) to serve as an interim report to the Director;

(2) to provide to the Director some points of consideration that can assist her in deliberations during the 1995 regulations-development process. These points of consideration will include:

(a) continued strong support by the Task Force for full implementation of AHM in 1996;

(b) reaffirmation to the Director of the need to support and fund strong communications and outreach efforts for AHM;

(c) general support for limited regulatory packages, with minor modification;

concern that the decision criteria likely would result in a liberal option for 1995; and

(e) possible scenarios for guiding her final course of action.

(3) to continue to meet as a group in order to further the full implementation of AHM as an accepted strategy for regulating waterfowl harvests.

The meeting adjourned at approximately 3:00 p.m.

Meeting of the Task Force for the

ADAPTIVE MANAGEMENT OF WATERFOWL HARVESTS

Arlington, Virginia
December 7, 1995

Attendees:

Task Force Members:

Ken Babcock (Missouri Department of Conservation)
Perry Olson (Colorado Division of Wildlife, retired)
Rollin Sparrowe (Wildlife Management Institute)
John Rogers (Fish and Wildlife Service)
Paul Schmidt (Fish and Wildlife Service)

Absent: Wayne MacCallum (Massachusetts Division of Fisheries and Wildlife)
William Molini (Nevada Division of Wildlife)

Service Regulations Committee Members:

Robert Streeter (Assistant Director, Refuges and Wildlife)
Dave Allen (Regional Director, Alaska)
Nancy Kaufman (Regional Director, Southwest)

Other Members of Flyway Councils:

David Hayden (Consultant/Chairman, Mississippi Flyway)
Vernon Bevill (Consultant, Central Flyway Council)
Tom Hinz (Consultant, Central Flyway Council)
Josh Sandt (Consultant, Atlantic Flyway Council)
Mike Szymczak (Consultant, Pacific Flyway Council)
Jim Greer, (Pacific Flyway Council)

Service Staff and Presenters:

Jerry Serie (Atlantic Flyway Representative)
Ken Gamble (Mississippi Flyway Representative)
Dave Sharp (Central Flyway Representative)
Jim Bartonek (Pacific Flyway Representative)
Ken Williams (North American Wetlands and Waterfowl Office)
Robert Blohm (Branch of Surveys and Assessment)
Graham Smith (Population and Habitat Assessment Section)
Fred Johnson (Population and Habitat Assessment Section)
Bryan Swift (New York State Fish and Wildlife)

Dave Case (DJ Case and Associates)

Welcome and Introductory Remarks

Deputy Director John Rogers:

Adaptive Harvest Management offers a fundamental revolution in duck harvest management. The 1995 AHM effort has been impressive. In January, when we first met, this Task Force directed the Management Office to proceed with AHM as far as possible in 1995. Director Beattie is pleased with the progress to date and looks forward to continued advancement in 1996 and beyond.

Assistant Director Bob Streeter:

The Adaptive Harvest Management progress in 1995 has been excellent. In resource management we need to keep focused on our stewardship needs. A critical element is the need for solid data with well-reasoned analyses. Migratory bird management is a highly successful joint effort by many management partners. AHM has the potential of strengthening and furthering these partnerships. The 1995 effort was a good start but much needs to be done in 1996.

Chief, MBMO Paul Schmidt:

Thank you to everyone for attending this third meeting of the Adaptive Harvest Management Task Force. This is an opportunity to look back and assess where we are and look forward to the challenges ahead - together. The first meeting of the AHM Task Force (January 27, 1995) grew out of a need to reform our regulations development process and provide the Director with advice on how to implement the adaptive approach. The AHM Task Force was to be the Director's "Board of Directors" for this process and review the technical progress on AHM and look at some strategic issues that needed to be addressed. That first meeting resulted in a recognition of the benefits of AHM:

* resolve long-standing disagreements on effects of hunting
* increase scientific objectivity in decision making
* provide clearer focus on the long-term
* better use of data gathering programs
* explicit understanding of harvest management objectives
* link research and management more effectively
* recognize uncertainty and account for it
* strengthen partnerships

The group tasked MBMO to move as far as possible toward AHM in 1995 and suggested that communications be a major effort at upcoming opportunities such as the North American Conference and the National Flyway Council.

Two new "official members" of the AHM Task Force were added at the second meeting (May 11, 1995). William Molini (Chairman, Pacific Flyway Council represented by Norm Saake) and Wayne MacCallum (Chairman, Atlantic Flyway Council) were added. There was continued support for the

process, but much discussion and concern over how far to go in 1995 and how to characterize the approach. The real concern expressed centered on the possibility that the abundance of breeding waterfowl might not change, yet the decision matrix would suggest a liberal season. How would this leap be explained? There was also concern that this was a mid-continent strategy and there was a need for a separate strategy for the Atlantic and Pacific Flyways, which only obtain a portion of their birds from the mid-continent region. There was strong commitment to using a limited number of regulatory packages and to making an effective communications effort.

This third meeting is to provide the Task Force and Flyway Regulations Consultants with information on the progress to date and future plans for 1996. The expanded attendance (Flyway Consultants) was in recognition of the need to build the necessary links to the formal regulatory process in the summer.

There has been significant progress made in communications and technical advancements since we last met. With this and the general support for the process, we must focus on the high expectations that have developed. AHM is not a panacea and we must correct the misunderstanding that exists in some minds that AHM equates to a liberal regulatory regime and good duck numbers. AHM is simply a process to improve the use of the data and make better decisions in the long-term.

The important points to consider for this meeting are:

* Flyways must deal with regulatory issues earlier in cycle
* no major overhauls to AHM, but need some adjustments
* objective function is well-endorsed
* range of packages needs to be carefully considered
* must realize some progress on strategies for pintails and eastern mallards
* need to address species currently not covered in an adaptive approach
* maintain communications effort

Adaptive management and the regulation of waterfowl harvests - Ken Williams

Ken provided an overview of the AHM process and the particulars of the 1995 approach. In general terms, adaptive management involves: (1) a choice of actions, accounting for uncertainty as to their consequences; (2) follow-up monitoring and assessment of population dynamics; and (3) utilization of the monitoring and assessment information in future decision-making. We use adaptive management to mean a systematic process of using information generated by management actions to improve biological understanding and inform future decision-making. In particular, we use the phrase "adaptive harvest management" to mean the active pursuit of information in the decision-making process.

The technical specification of AHM involves: (1) a set of regulatory options; (2) a set of alternative models by which to describe population dynamics; (3) measures of uncertainty for the models (referred to as model weights); (4) an objective function with which to evaluate regulatory options; and (5) monitoring programs that provide data for the process. Each model describes population dynamics in terms of population size, environmental conditions, and regulations. The models represent different hypotheses about the impacts of regulations, and the model weights represent likelihoods that the

corresponding hypotheses are most appropriate. The weights change through time, as comparisons of model predictions and observations from the monitoring program provide assessments of model reliability.

AHM is a objective-based, data-driven process for making decisions, wherein harvest regulations are based on an identified objective function and are dependent on observed population and habitat conditions. It is the comparison of model predictions against monitoring data that enables one to recognize the relevance of alternative biological hypotheses for future management. In this sense an adaptive approach integrates harvest objectives, biological mechanisms, and population assessment into an explicit decision-making framework.

Communications update - Dave Case

Dave Case reviewed AHM communications efforts in 1995. Evaluated against the goals and objectives set forth in the communications strategy, communications in 1995 were successful. The fact that duck populations increased dramatically was a significant help. Although much remains to be accomplished, key internal and external audiences were reached through the communications effort and the groundwork for building additional support was laid. The efforts put forth by the Working Group, Task Force, and the Service were key to the success of the communications efforts. Dave passed out a summary of media coverage of AHM. He also distributed a summary of comments from a telephone survey of 20 state technical people (5 from each Flyway).

Comments regarding the 1995 regulations cycle - Task Force members and Flyway Regulations Consultants

Meeting participants were asked to provide their perspectives of the 1995 AHM process.

Mike Szymczak (Pacific Flyway Council), felt the process generally worked well, although there was some concern about inadequate consultation with the Flyways early in the process. Mike urged managers to use "common sense" when dealing with issues not now formally tied to AHM (e.g., redhead bag limits). He also pointed out that the Pacific Flyway is anxious to develop AHM approaches for pintails and "western" mallards and is beginning to conduct the necessary biological assessments.

Nancy Kaufman (FWS Region 6) was concerned about the research and assessment capabilities needed to support the AHM approach. Budget cut-backs in NBS and FWS will strain our ability to do good science.

Josh Sandt's (Atlantic Flyway Council) primary concern was over communications. This year's good news on the prairies made an easy sell of AHM, but he wondered whether it will be the same when the status of populations and habitats declines. Hunters generally don't understand AHM and some are concerned that we went too far in liberalizing regulations this year. Josh also expressed an interest in considering other regulatory options that could increase hunter opportunity without increasing harvest.

Jerry Serie (Atlantic Flyway Representative) mentioned the continuing desire to integrate "eastern"

mallards into the AHM process. AHM provides a sound basis to do this, but much technical work remains to be completed.

Tom Hinz (Central Flyway Council) was concerned about stocks of ducks other than mid-continent mallards, particularly pintails and redheads. He also had some questions about the nature of the regulatory options and whether there are opportunities to make modifications to bag limits. Overall, Tom believed that the 1995 regulatory process was a major success. However, he worried a lot about the future of the Farm Bill and whether the good times will continue.

Vernon Bevill (Central Flyway Council) believed that 1995 was largely successful. The importance of the joint Council meeting in July, 1996 is becoming more apparent. Vernon believed we should take advantage of that opportunity to better educate managers and to solidify support for AHM. He also believed we should do a better job of "marketing" migratory bird management to help ensure adequate support and funding from Congress. Vernon stressed the need to assess the cost-effectiveness of data-collection programs.

Perry Olson (Colorado Div. Wildl., retired) was pleased about how far we've come. However, he believed that we cannot relax our communications efforts, particularly with internal audiences. We also should build public confidence via a better understanding of the AHM approach. He also believed that we need to "institutionalize" AHM so that it is protected against changes in administrations. Perry also urged managers to develop a calendar describing the 1996 AHM process in detail.

Dave Sharp (Central Flyway Representative) believed that we need to better inform other agency personnel about AHM. He also pointed out that communications efforts should be designed to deal with perceived inequities that might arise in AHM. Dave also reminded everyone of budget cut-backs and the potential effects on data needed to drive the process.

David Allen (FWS Region 7) asked managers to be cognizant of the high expectations about AHM. There appear to be high workload demands associated with extending the AHM process to pintails and other stocks of ducks.

Rollie Sparrowe (Wildlife Management Institute) emphasized that most of the public doesn't know anything about AHM and that any concerns this year were overshadowed by the high estimates of breeding populations. He believed that conservation groups may have been focused elsewhere (e.g., Farm Bill) and that the real challenges to AHM may come later. Rollie expressed the continuing difficulties in dealing with Congress.

Dave Hayden (Mississippi Flyway Council) commented on the number of positive news articles combining AHM, CRP, good water on the prairies, etc. He was concerned that perhaps these articles may have prompted too much optimism regarding future hunting opportunities. He urged the group to continue to place a high priority on communication efforts.

Ken Babcock (Mississippi Flyway Council) was generally pleased with the 1995 process. There were some unfortunate distractions (e.g., redheads), but it's clear that efforts are being made to address

these concerns. Ken believed that there is inadequate understanding of AHM among managers and that we need to look to The Wildlife Society and the International Association of Fish and Wildlife Agencies to help with education. He also felt that we must strive to communicate with the public in terms they can understand. Ken believed that the learning aspect of AHM must be emphasized. Ken also mentioned a concern about future changes in administrations and how this might affect the AHM initiative.

Ken Gamble (Mississippi Flyway Representative) believed that 1995 represented a good beginning, but there are a number of concerns that must be addressed prior to 1996. Many of those concerns are not new (e.g., multi-species management), and it should be recognized that it will take time to deal with them. Thus, Ken emphasized the need to set priorities, particularly with respect to species-specific bag limits.

Policy choices in adaptive harvest management (*or there ain't no such thing as a free lunch*) - Fred Johnson

Fred emphasized that certain aspects of AHM involve value judgements rather than empirical assessments. This is particularly true of the objective function and the set of regulatory options. This presentation was intended to demonstrate how optimal harvest strategies and their expected performance vary: (1) with changes in emphasis on the goal of the North American Waterfowl Management Plan (NAWMP); and (2) with varying control over harvest rates.

Optimal harvest strategies become increasingly conservative with increasing emphasis on the NAWMP goal. The number of mid-range regulatory options in the optimal strategy is highest with moderate emphasis on the population goal. As emphasis on the NAWMP goal increases: (1) mean annual harvest decreases and its variability increases; (2) mean breeding population size increases and its variability decreases; and (3) the frequency of regulatory changes increases.

In most cases, the number of regulatory options have little influence on optimal strategies or on the expected sizes of the harvest and mallard breeding population. However, fewer regulatory options result in lower frequency of annual regulatory changes. Poor ability to achieve target harvest rates lead to a decrease in harvest, and an increase in population mean, population variability, and in annual variability of harvest. The ability to achieve target harvest rates seems to be of more consequence than the number of regulatory options in the performance of mallard harvest strategies.

The results of these and other investigations highlight the difficult tradeoffs faced by managers. Fortunately, AHM provides the framework necessary to quantify these tradeoffs so that managers can make informed decisions.

Adaptive harvesting of multiple stocks - Bryan Swift

Bryan's presentation covered the conceptual issues involved in extending the AHM framework beyond mid-continent mallards. Major conclusions are that: (1) extending application of AHM essentially

involves delineation of waterfowl "stocks" (i.e., we should not necessarily assume that every species or potential population must be managed independently); (2) there are both material benefits and costs associated with delineating numerous stocks; (3) we need realistic appraisals of our ability to harvest stocks selectively; and (4) we must establish priorities and protocols for moving forward.

Managers long have sought to maximize total yield (or at least harvest opportunity) by apportioning harvest pressure among waterfowl stocks in an optimal way. However, we have not always approached the issue in a consistent or coherent manner. The AHM framework provides a excellent opportunity to conduct realistic assessments of the expected benefits and costs of multi-stock management. Of course, this does not relieve us in the short-term of the need to consider a multitude of stocks in the regulations-setting process. Perhaps the biggest challenge facing us is development of interim protocols that permit changes in species-specific hunting regulations that are consonant with resource status and management goals.

Implications of AHM for the administrative decision-making process - Bob Blohm

Bob discussed some of the implications of AHM for the administrative decision-making process in annual hunting regulations. The timing and availability of survey and production information, habitat (pond) information, and band recovery data have historically controlled the timetable of regulatory events. Significant advances have been made in recent years to expedite the transfer of information from the field, and the speed at which data are subsequently compiled, analyzed, and interpreted has increased significantly as well. The end result is that there may be greater flexibility now within the overall regulatory timetable than has existed in the past. However flexibility is limited by the various administrative acts, such as the Administrative Procedures Act, Regulatory Flexibility Act, and Paperwork Reduction Act, and other administrative requirements: these dramatically constrain the timing of regulations setting.

Long-standing interest in streamlining the administrative process associated with regulations development offers some obvious benefits; however concerns have been raised. We must remember that goose, swan, and migratory shore and upland game bird regulations are not AHM-based, but depend on traditional survey data or recently-developed breeding ground population or habitat assessments and associated timetables for data availability.

Full implementation of AHM, expanded to cover all migratory game bird species, will alter the nature of summer Flyway Technical Committees, Flyway Councils, and SRC meetings as we know them today. The 'prescriptive' nature of some aspects of AHM will not diminish the role of productive dialogue for the SRC and the Consultants. However, the topics to discuss will change considerably. Debate over harvest guidelines and subsequent harvest recommendations will shift to discussions of the impact of survey results on the models, which models work best, what have we learned, and why the regulatory decisions for this year are improved over last year. Other issues could involve appropriate communication strategies designed to maintain public confidence in the approach. However, given that most issues requiring thorough review and consensus, such as the composition of actual regulatory packages or options and the management objectives, will have already been decided upon, it is conceivable that the justification for conducting summer SRC meeting in their present form

will diminish as more species are included under AHM.

Communication strategies for 1996 - Dave Case

Dave Case presented some of the major issues that need to be considered in developing the 1996 communications strategy. As was the case last year the issue that will have the most impact on communications efforts is the status of duck populations this spring. A decline in populations, especially if liberal regulations are still indicated in the decision-matrix, will create a greater communications challenge with both internal and external audiences than if populations are stable or increase. For this reason, different communications scenarios will be developed based on what populations do. A timetable for developing and implementing the communication strategy for 1996 was reviewed. The Working Group will work on the communications strategy at their meeting in January and a detailed strategy, including scenarios, will be completed by February 23, 1996.

Implementing AHM: balancing expectations with reality - Paul Schmidt

Where do we go from here? Work continues on developing strategies for eastern and western mallards and pintails; however, it is not clear whether the technical work will be done in time for 1996. During the winter, the AHM working group will need to address the issue of the regulatory packages with appropriate Flyway Council input. There will be numerous opportunities to continue the communications effort over the next several months (Flyway Technical and Council meetings, DU symposium, etc.), but there are limited funds for this effort. The Task Force feels very strongly that communications are critical within our internal and some of the external audiences. The participants indicated a willingness for the States and Councils to find funding to support the effort, such as a video of the presentations by Johnson and Williams.
MBMO will pursue a partnership project with the States/Councils to complete a video. Also, it was suggested that the IAFWA Communications Committee might be a source of assistance in the projects. State agencies may also be able to assist in production capability.

It was agreed that we need stability in the objective function and there was no desire to make significant adjustments in that. There were differing views on whether to expand the range/number of regulatory packages. The Task Force suggested that the working group try to clarify this issue, putting together a "white paper" on the alternatives and the cost/benefit analysis for the decision-makers. More packages means more annual variation in regulations, possibly reduced learning rates, but perhaps a minimal increase in harvest.

The priority species for incorporating into AHM includes eastern mallards, pintails, and western mallards. There is a need for the technical group to develop some protocols for the highest priority species not covered by the strategy, such as redheads for 1996.

Most participants indicated the meeting was very worthwhile and recommended that we consider a future meeting of this sort as necessary; perhaps next Fall to again assess progress in the process.

Summary of Task Force recommendations

(1) There needs to be a continued strong focus on communication efforts. These efforts will be particularly important for internal audiences that do not yet have a clear understanding of AHM. Development of a training video for agency biologists and managers, as well as for other technical audiences, should be considered (some discussion that the costs should be borne by both the Service and the Flyways).

(2) Managers should not loose sight of the primary motivation for AHM (i.e., the ability to resolve long-standing controversies about the effects of harvest). In making decisions about objectives, regulatory options, etc., emphasis should be placed on enhancing our ability to learn.

(3) The AHM Working Group is urged to develop a set of alternatives for the technical specifications of the 1996 approach. Each alternative should be accompanied by expected consequences in terms of relevant parameters, such as harvest opportunity, population size, and learning rates. These alternatives will allow Flyway Technical Committees and Councils to make informed decisions about the AHM approach for 1996.

(4) Managers need to keep in mind the costs when building the AHM key elements. It is important to not build a system that needs additional data and survey efforts. Managers need to be cognizant of existing monitoring efforts and related costs. It is likely that allocation of resources for monitoring will become more difficult in the future and it is important that these resources be allocated in an optimal manner.

(5) The Service and the Flyway Councils need to institutionalize AHM . AHM is a long-term process and its utilization necessitates a long-term commitment.